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Claims:

1. A method of using ionic liquids such as molten salts as solvents in headspace gas chromatography wherein said method comprises dissolving or dispersing a sample in at least one ionic liquid and volatilizing the volatile components of the sample.

2. The method according claim 3 wherein the ionic liquid has a melting point of less than 100°C.

3. The method according to claim 2 wherein the ionic liquid has a melting point of less than 30°C.

4. The method according to any preceding claim wherein the ionic liquid has a vapor pressure of less than about 1 mm/Hg at 25°C.

5. The method according to claim 4 wherein the ionic liquid has a vapor pressure of less than about 0.1 mm/Hg at 25°C.

6. The method according to claim 5 wherein the ionic liquid has essentially no vapor pressure.

7. The method according to any preceding claim wherein the thermal stability of the ionic liquid is form 150°C to 400° C.

8. The method according to claim 7 wherein the thermal stability of the ionic liquid is from 200° C to 300° C.

9. The method according to claim 1 wherein the ionic liquid has a melting point of less than 250°C, a vapor pressure less than about 1mm/Hg at 25°C and the thermal stability of the ionic liquid is from 150° C to 400° C.

10. The method according to any preceding claim wherein the anion of the ionic liquid is selected from the group consisting of Cl^-, Br^-, NO_2^-, NO_3^-, $AlCl_4^-$, BF_4^-,.PF_6^-,CF_3COO^-, $CF_3SO_3^-$, $(CF_3SO_2)_2N^-$, OAc^-, $CuCl_3^-$, $GaBr_4^-$, $GaCl_4^-$, and SbF_6^-.

11. The method according to any preceding claim wherein the cation of the ionic liquid is selected from the group consisting of pyridinium, ammonium, imidazolium, phosphonium, and sulphonium.

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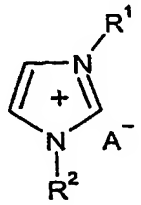
12. The method according to any preceding claim wherein the ionic liquid is selected from the group consisting of an imidazolium salt, pyridinium salt, ammonium salt, phosphonium salt, and sulphonium salt, and mixtures thereof.

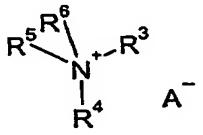
13. The method according to claim 12 wherein the imidazolium salt has formula (I)



(I)

wherein R^1 and R^2 are independently selected from the group consisting of a C_1-C_{18} aliphatic group and a C_4-C_{18} aromatic group; and A^- is an anion.

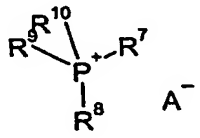
14. The method according to claim 12 wherein the ammonium salt has formula (II)



(II)

wherein R^3, R^4, R^5 and R^6 are independently selected from the group consisting of a C_1-C_{18} aliphatic group and a C_4-C_{18} aromatic group; and A^- is an anion.

15. The method according to claim 12 wherein the phosphonium salt has formula (III)



(III)

wherein R^7, R^8, R^9 , and R^{10} are independently selected from the group consisting of a C_1-C_{18} aliphatic group and a C_4-C_{18} aromatic group; and A^- is an anion.

16. The method according to claim 12 wherein the pyridinium salt has formula (IV)

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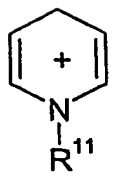

(IV)

wherein R^{11} is selected from the group consisting of a C_1-C_{18} aliphatic group and a C_4-C_{18} aromatic group; and A^- is an anion.

17. The method according to any preceding claim wherein the ionic liquid is selected from the group consisting of 1-butyl-3-methylimidazolium hexafluorophosphate, 1-hexyl-3-methylimidazolium hexafluorophosphate, 1-octyl-3-methylimidazolium hexafluorophosphate, 1-decyl-3-methylimidazolium hexafluorophosphate, 1-dodecyl-3-methylimidazolium hexafluorophosphate, 1-ethyl-3-methylimidazolium bis((trifluoromethyl)sulphonyl)amide, 1-hexyl-3-methylimidazolium bis((trifluoromethyl)sulphonyl)amide, 1-hexylpyridinium tetrafluoroborate, 1-octylpyridinium tetrafluoroborate, 1-butyl-3-methylimidazolium tetrafluoroborate, 1-methy-3-ethyl imidazolium chloride, 1-ethyl-3-butyl imidazolium chloride, 1-methy-3-butyl imidazolium chloride, 1-methy-3-butyl imidazolium bromide, 1-methyl-3-propyl imidazolium chloride, 1-methy-3-hexyl imidazolium chloride, 1-methy-3-octyl imidazolium chloride, 1-methy-3-decyl imidazolium chloride, 1-methy-3-dodecyl imidazolium chloride, 1-methy-3-hexadecyl imidazolium chloride, 1-methy-3-octadecyl imidazolium chloride, 1-methy-3-octadecyl imidazolium chloride, ethyl pyridinium bromide, ethyl pyridinium chloride, ethylene pyridinium dibromide, ethylene pyridinium dichloride, butyl pyridinium chloride, benzyl pyridinium bromide, and mixtures thereof.

18. The method according to claim 17 wherein the ionic liquid is selected from the group consisting of 1-octyl-3-methyl-imidazolium hexafluorophosphate, 1-hexyl-3-methy-imidazolium hexafluorophosphate, 1-butyl-3-methyl-imidazolium hexafluorophosphate, 1-butyl-3-methyl-imidazolium tetrafluoroborate, 1-butyl-3-methyl-imidazolium trifluoromethanesulfonate, 1-ethyl-3-methyl-imidazolium trifluoromethanesulfonate, and 1-ethyl-3-methyl-imidazolium bis-(trifluoromethanesulfonyl)-amide.

19. The method according to any preceding claim to detect volatile components in a sample by headspace gas chromatography, wherein said method comprises dissolving or

dispersing a sample in at least one ionic liquid and volatilizing the volatile components of the sample.

20. The method according to any preceding claim to identify volatile components in a sample by headspace gas chromatography, wherein said method comprises dissolving or dispersing a sample in at least one ionic liquid and volatilizing the volatile components of the sample.

21. The method according to any preceding claim to quantify volatile components in a sample by headspace gas chromatography, wherein said method comprises dissolving or dispersing a sample in at least one ionic liquid and volatilizing the volatile components of the sample.

22. The method according to any preceding claim wherein the sample is a pharmaceutical compound.

23. The method according to any preceding claim to detect impurities in a pharmaceutical compound by headspace gas chromatography, wherein said method comprises dissolving or dispersing a pharmaceutical compound in at least one ionic liquid and volatilizing the volatile components of the pharmaceutical compound.